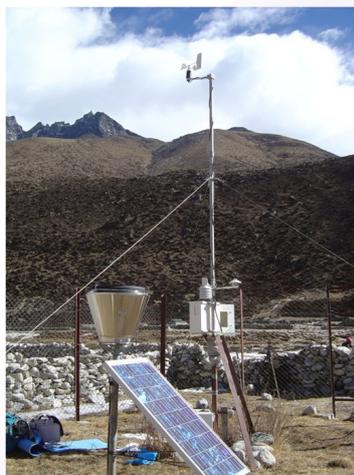


Speedwell Weather



Speedwell Weather Settlement Services

**Environmental
Finance 2015**
Annual Market Rankings
Winner





The Problem: Data

Since the inception of the weather market there has been a balancing act between using “tradable weather stations” and basing a hedge on what the client really needs. All too often the quality of data required for pricing and settlement does not exist. Many transactions never come to fruition simply because data is not available. Sometimes transactions are struck on alternative sites which introduces unwanted basis risk to the hedger given a less than ideal correlation with their actual exposure.

Another component of the data problem is the potential for tampering with observations - “moral hazard”. Many over-the-counter (OTC) contracts are written on 2nd and 3rd tier station networks that do not have the security of the first order sites which are often located at airports.

Speedwell Weather is the dominant provider of settlement data for OTC weather risk transactions world-wide.



The Requirements

- Long time series of the weather variable allowing accurate pricing
- Reliable time series. Discontinuities may exist, but ideally the history should be adjusted for these.
- Few missing data points. But missing data is inevitable. Provision of a cleaned and filled data history is therefore necessary.
- Reference site should correspond to the hedger’s risk.
- Provision of sub-daily data may help improve the efficacy of the hedge and reduce its cost.
- A “high integrity” reference site: one that is perceived as being unlikely to be tampered with and which will be reliable.
- A site which is not about to be moved or where instruments are to be upgraded.
- A site where fall-back measurements can be relied upon if the primary site has reporting problems.
- Real-time data updates to allow rapid settlement of the contract

Speedwell: How we can Help

- Having worked in the weather risk market since 1999 we understand what market participants require. Larger transactions that involve the movement of risk to the secondary market will often benefit from an independent third party verifying observations. Speedwell is the dominant provider of settlement data for over-the-counter weather risk contracts.
- Speedwell has access to a large library of tens of thousands of weather data stations around the world. We therefore are able to help select appropriate sites based on criteria from client or hedge provider relating to location, data completeness, update frequency, availability of hourly data etc.
- Speedwell can help ensure that weather data used for transactions satisfies the requirements for both hedger and risk provider.
- Speedwell can act as an independent third party focused on guaranteeing the reliability and quality of the observations while respecting the need for transparency - we understand that market participants require a complete understanding of our data processing. We understand the importance of quality, provenance and auditability.
- We are able to install weather stations to act as fall-backs and to address concerns relating to possible moral hazard.



Speedwell Weather Station: Chile



Speedwell's Role in Addressing Data Problems

#1 *Missing / erroneous historical data*



- Problem: ***Without reliable / accurate historical data pricing is difficult if not impossible.***
 Solution: Speedwell's cleaning / backfilling methodologies can make previously unusable data usable. Beginning with the highest quality data available a series of quality control checks compares observed values against surrounding stations and the station itself, suspect values are flagged for additional review. Erroneous observations and missing data is then filled using modelled observations.

#2 *On-going feeds for deal monitoring and settlement*



- Problem: ***Unreliable and potentially erroneous data feeds cannot be used for settlement.***
 Solution: Using technologies developed to create settlement values for the Chicago Mercantile Exchange, Speedwell can produce accurate and reliable settlement feeds for most stations. All techniques are transparent to the user and can be pre-agreed in contract settlement language. Approaches to ensuring data integrity include "surrounding station analysis", supplementing observations with forecast data, radar and satellite data and for larger transactions installing back-up weather stations.

#3 *Moral hazard risk*



- Problem: ***Weather settlement values can be subject to moral hazard.***
 Solution: Prevention and detection of tampering can involve "statistical security", physical security, or a combination of both. Statistical security involves the analysis of the inter-relationship between observations. Departures from known relationships can be cause for concern (for example, rainfall observed with no increase in relative humidity). Methodologies also involve the analysis of observations as compared with surrounding observations (possible station installation). Physical security involves the implementation of barriers to tampering (electric fence, advanced instrument mounting, inaccessible locations) as well as monitoring of a site (motion detectors, cameras, security personnel). The end product is a dataset produced by an independent 3rd party acceptable to all parties.

#4 *No historical data for new stations*



- Problem: ***Newly installed weather stations have little to no historical observations for pricing.***
 Solution: Advanced data modelling techniques allows for the creation of simulated data. Inputs of surrounding station data, re-analysis data fields, and meteorological know how all contribute to building a representative dataset for a new station. As with all Speedwell products, the methodology is fully disclosed and agreed upon by all clients.

#5 *Delayed settlement feeds*



- Problem: ***A common problem with observing sites is a delay in obtaining observations.***
 Solution: There are numerous techniques available for producing preliminary settlement values.
 - Statistical modelling of an observation from surrounding stations
 - Supplementing observations with surrounding readings
 - Using forecast data, satellite data and radar data



Case Study — Precipitation Coverage

Concerns: **Delayed settlement data**
 Reliability concerns
 Moderate moral hazard risk

Risk location station	Rugged location, existing manual gov't station
On-going feeds	30-90 day reporting delay (moderate quality)
Historical data	20+ years with limited gaps (moderate quality)
Risk period	6 month period per annum
Variables	Daily precipitation
Other	Limited availability of surrounding high-quality observations



This all too common situation may cause a potential transaction to be abandoned or for pricing to incorporate a higher “uncertainty” premium.

Problems:

- (1) **Data reporting delays result in the inability to monitor the trade in real-time**
- (2) **Continued operation of the human-operated government station is in doubt**
- (3) **Perceived of possible moral hazard risk**

Solution: The installation of a dedicated weather station near the risk location. This acts as a backup and a quality reference for the official government observations.

Considerations:

- Determine the number of stations needed to reliably quality control the government observations.
- Examine location specific constraints (power, communications, availability of equipment, station maintenance) and climatological compatibility of installation sites.
- Specify equipment needed
 - sensors to be used respecting local needs (in this example, anticipating heavy snow)
 - physical security (electric fencing, surveillance equipment)
- Source equipment (import / export restrictions) local availability of supplies.
- Negotiate land usage rights for installing the station.
- Physical installation of the station.
- Configure communications systems.
- Develop a quality control algorithm in order to certify the government observations for settlement. It is important that all parties agree with the transparent methodology.
- Process station data, process government data, apply quality control algorithm to produce settlement data.
- Deliver settlement data and supporting documentation to parties involved.
- Instrument maintenance
 - frequent calibration
 - preventative maintenance
 - unexpected system repairs
- Decommissioning / handover of the station

End Result: The installation of weather stations ensures a reliable source of data for tracking the trade and producing settlement data.

Costs: Costs vary significantly from situation to situation. This type of solution is most applicable for larger transactions. Often the cost is shared by both parties.



Examples of Speedwell Settlement-Services Projects

- Chicago Mercantile Exchange
 - * Production of settlement data for Australian weather futures contracts since 2008
- Colbun, Chile
 - * Processing / cleaning historical observations for pricing the structure
 - * Installation and maintenance of weather stations
 - * Appointed as settlement agent: production of meteorological settlement data
 - * Assisting with the hedge structure
- UTE / World Bank, Uruguay (\$450 million USD in risk)
 - * Processing / cleaning historical observations for pricing the structure
 - * Installation and maintenance of weather stations (full AWS and precipitation-only instruments)
 - * Appointed as settlement agent: production of meteorological settlement data
 - * Calculation agent for bi-lateral margining purposes
- Over-the-Counter Weather Hedging
 - * Processing / cleaning historical observations for pricing structures
 - * Provision of meteorological settlement data for numerous



Speedwell Weather Station:, Chile



Speedwell Weather Station: Uruguay

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Best Global Weather Risk Management Advisory /
Data Service Winner for the 8th consecutive year

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